

CLAIMS

1. A method of indicating the location of a relatively mobile object, comprising the steps of:

- 5 (a) generating a first signal that is characteristic of a first, relatively immobile object;
- (b) transmitting the first signal from the first relatively immobile object;
- (c) detecting the first signal at a receiver;
- (d) generating a second signal that is characteristic of a
10 second, relatively immobile object;
- (e) transmitting the second signal from the second, relatively immobile object;
- (f) detecting the second signal at a receiver;
- (g) generating a third signal that is characteristic of the
15 relatively immobile object;
- (h) detecting the third signal at a receiver;
- (i) operating a processing device operatively connected to the receiver using signal time-of-flight (t-o-f) data and/or received signal strength information (RSSI) to establish the distance of the relatively
20 mobile object respectively from the first and second relatively immobile objects; and
- (j) generating a signal indicating whether the relatively mobile object is for the time being closer to the first or the second relatively immobile object as the case may be.

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2. A method according to Claim 1 including the step of, before carrying out step (a):

- (k) locating on each of the relatively mobile and first and second relatively immobile objects a respective portable transmitter that is
30 capable of generating and transmitting a said signal that is characteristic of the object on which it is located.

3. A method according to Claim 2 including, after carrying out step (k):

(l) the step of supplying, via an input device, data to the processing device that associates each said portable transmitter with the object on which it is located.

4. A method according to Claim 3 wherein step (j) includes assessing data supplied to the processing device whereby the signal indicating whether the relatively mobile object is for the time being closer to the first or the second relatively immobile object includes data identifying:

(1) the relatively mobile object; and
(2) at least the relatively immobile object to which it is closer / closest.

5. A method according to any preceding claim wherein Step (i) includes determining the signal tof data by obtaining timing information between first and second devices using the steps of:

- transmitting a timing signal from the first device to the second device at a time t1 relative to the local clock of the first device and measuring the time of arrival t2 of that signal at the second device relative to the local clock of the second device;

- transmitting a timing signal from the second device to the first device at a time t3 relative to the local clock of the second device and measuring the time of arrival t4 of that signal at the first device relative to the local clock of the first device; and

- assembling the values of t1, t2, t3 and t4 in a single device.

6. A method according to any preceding claim wherein Step (i) includes a 1-beacon, 2-beacon or 3+-beacon RSSI determination.

7. A method according to any preceding claim wherein Step (j) includes:

carrying out a contextual conversion using a look-up table stored in a memory device to interpret co-ordinates corresponding to the locations of the said objects, and generating one or more messages indicative of the identity of one or more said objects..

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8. A method according to Claim 2 or any preceding claim dependent therefrom, wherein Step (k) includes adhering a portable transmitter to each respective object, using an adhesive material.

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9. A method according to Claim 2 or any preceding claim dependent therefrom, wherein Step (j) includes:

(m) activating each said portable transmitter from a deactivated state.

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10. A method according to Claim 9 wherein the step (m) includes:

(n) removing each said portable transmitter from a storage location, interaction between each portable transmitter and the storage location maintaining it in the said deactivated state and the said removing causing the said activation.

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11. A method according to Claim 3 or any preceding claim dependent therefrom, wherein the step (l) includes entering data via one or more of a keyboard, a keypad or a voice input device operatively connected to the processing device.

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12. A method according to Claim 3 or any preceding claim including, before step (l):

(o) prompting a user as to the class of data, selected from a set of classes, requiring inputting.

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13. A method according to Claim 12 wherein the set of classes includes at least:

relatively mobile objects;
relatively immobile objects; and
base stations.

5 14. A method according to any preceding claim including, before step (j):

(p) interrogating via an input device the processing device as to the location of a said relatively mobile object.

10 15. A method according to Claim 14 wherein step (p) includes interrogating the processing device via one or more of a keyboard, a keypad or a voice recognition device operatively connected to the receiver.

15 16. A method according to any preceding claim wherein the step (j) includes transmitting or displaying a message to a user via one or more of a display screen or a speech synthesiser that is operatively connected to the processing device.

20 17. Apparatus for indicating the location of a relatively mobile object, comprising:

two or more first portable transmitters that are capable of generating and transmitting signals each characteristic of a respective relatively immobile object, the first portable transmitters each being locatable on a said relatively immobile object;

25 one or more second portable transmitters that are capable of generating and transmitting signals each characteristic of a said relatively mobile object, the or each second portable transmitter being locatable on a respective said relatively mobile object;

30 a receiver that is capable of receiving the signals generated by the transmitter;

a processing device that is capable of establishing, using signal t-o-f data and/or RSSI, the distance of a said second transmitter,

located on a said relatively mobile object, from each of two said first transmitters located on respective said relatively immobile objects; and
a signal generator capable of generating a signal indicative of the said first transmitter to which the said second portable transmitter is
5 for the time being closer / closest.

18. Apparatus according to Claim 17 including an input device for inputting to the processing device data that associates each portable transmitter with the object on which it is located.

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19. Apparatus according to Claim 18 wherein the input device includes one or more of a keyboard, a keypad or a voice input device operatively connected to the processing device.

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20. Apparatus according to any of Claims 17 to 19 wherein the processing device is programmable and is programmed to establish the distance of a said second transmitter from each of said first transmitters, by obtaining timing information between first and second devices using the steps of:

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- transmitting a timing signal from the first device to the second device at a time t_1 relative to the local clock of the first device and measuring the time of arrival t_2 of that signal at the second device relative to the local clock of the second device;

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- transmitting a timing signal from the second device to the first device at a time t_3 relative to the local clock of the second device and measuring the time of arrival t_4 of that signal at the first device relative to the local clock of the first device; and

- assembling the values of t_1 , t_2 , t_3 and t_4 in a single device.

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21. Apparatus according to any of Claims 17 to 20 wherein the processing device is programmable and is programmed to establish the distance of a said second transmitter from each of said first transmitters, according to a 1-beacon, 2-beacon or 3+-beacon RSSI determination.

22. Apparatus according to any of Claims 17 to 21 including an adhesive material for adhering each said portable transmitter to a respective said object.

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23. Apparatus according to Claim 22 wherein each said portable transmitter includes the adhesive material permanently secured thereto so as to present an adhesive surface for securing the transmitter to a said object.

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24. Apparatus according to any of Claims 17 to 22 wherein each said transmitter is switchable between a deactivated (non-transmitting) and an activated (transmitting) state.

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25. Apparatus according to Claim 24 including a storage member for storing thereon each portable transmitter at least before first use, the storage member and the transmitter co-operating to maintain the transmitter in its deactivated state until its removal from the storage member on first use.

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26. Apparatus according to Claim 23 and Claim 25 wherein the adhesive surface temporarily secures each transmitter to the storage member at least before first use of the transmitter.

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27. Apparatus according to Claim 25 or Claim 26 wherein the storage member is or includes a flexible sheet to which each transmitter is secured before first use.

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28. Apparatus according to Claim 25 or any preceding claim dependent therefrom, wherein the storage member includes a respective member that co-operate with each said transmitter stored thereon before first use in order to maintain the deactivated state of the said transmitter.

29. Apparatus according to any of Claims 17 to 28 including an output device operatively connected to the processing device.

30. Apparatus according to Claim 29 when dependent from
5 Claim 18 wherein the processing device is programmable and is programmed to generate a prompt as to data requiring entry via the data entry device and as appropriate display or transmit the prompt via the output device.

10 31. Apparatus according to Claim 29 or Claim 30 wherein the output device is or includes one or more of a display screen or a speech synthesiser.

32. Apparatus according to any preceding claim wherein the
15 processing device is programmable and is programmed to carry out a contextual conversion on data indicative of the said first transmitter to which the second transmitter is for the time being closer / closest.